REVISED 5-7-87

FAILURE NODE AND CAUSE OR END ITEM OR END ITEM OR END ITEM OESIGN FEATURES I) No PIU control 2) No video Morst Case: Loss of mission critical video. Morst Case: Loss of mission critical video. In the MS Bulkhead cable is a 60-inch long assembly, 17-wire assembly originating at the cargo bay and bulkhead. The cable provides power and commands to cargo bay camera is and returns video to the bulkhead position. The video and sync wires are shielded in Twinax twisted-pair wires. In cable design is taken from the successfully flows Apollo program. The design is cable-connector assembly in which the wire terminations are protected from excessive flexture at the joint between the wire and the connector terminal. The load concentration is moved away from the conductor connection and distributed axially all the length of the conductors encapsulated in a potted-tager profile. This technique also protects the assembly from dirt and entrapped moisture which could cause problet in space. The cable and its components meet the applicable requirements of NASA, Military and specifications. These requirements include: General/Mechanical/Electrical Features	FMEA NO. W 5.12 CRITICALITY 2/2		SHUTTLE CCTV CRITICAL ITEMS LIST	UNIT CAGTE DRG NO. 2293288-502, 503 15SUED 10-14-85 SHEET 1 OF 5
The MS Bulkhead cable is a 60-inch long assembly, 17-wire assembly originating at the cargo bay and bulkhead. The cable provides power and commands to cargo bay camera and returns wideo to the bulkhead position. The video and sync wires are shielded in Twinax twisted-pair wires. The cable design is taken from the successfully flows Apollo program. The design is cable-connector assembly in which the wire terminations are protected from excessive flexture at the joint between the wire and the connector terminal. The load concentration is moved away from the conductor connection and distributed axially all the length of the conductors encapsulated in a potted-taper profile. This technique also protects the assembly from dirt and entrapped moisture which could cause proble in space. The cable and its components meet the applicable requirements of NASA, Military and specifications. These requirements include: • General/Mechanical/Electrical Features			RATIONALE FOR ACCEPTANCE	
Design and Construction Materials Terminal Solderability Environmental Qualification Marking and Serialization Traceability and Occumentation	•	2) No video <u>Horst Case</u> : Loss of mission	The MS Bulkhead cable is a 60-inch long assembly, cargo bay and bulkhead. The cable provides power and returns video to the bulkhead position. The video to the cable design is taken from the successfully floable-connector assembly in which the wire terminal flexture at the joint between the wire and the conconcentration is moved away from the conductor contine length of the conductors encapsulated in a pot also protects the assembly from dirt and entrapped in space. The cable and its components meet the applicable respective and its components meet the applicable respective and Construction of Materials. Terminal Solderability Environmental Qualification Marking and Serialization	and commands to cargo bay camera stack idea and sync wires are shielded #24 own Apollo program. The design is a stack of the same protected from excessive spector terminal. The load spection and distributed axially along ted-tager profile. This technique i moisture which could cause problems

FMEA NO. W 5.12 CRITICALITY 2/2		SHUTTLE CCTV CRETICAL ITEMS LIST	DWG NO. 229328B-502, 503 15SHEU 10-14-86 SHEET 2 DF 5	
FATLURE MODE AND FAILURE EFFECT ON END ITEM		RATIONALE FOR ACCEPTANCE		
CRITICALITY 2/2		Qualification tests of CCTV LRUs. ACCEPTANCE TEST The cable acceptance test consists of an ohumeter chromection is present and intact. Results are record OPERATIONAL TEST The following tests verify that CCTV components are the PHS (A7A1) panel switch, through the RCU, through to the Comera/PTU command decoder are proper. The tability to produce video, the VSU's ability to route display video. A similar test verifies the HDM common Pre-Launch on Orbiter Test/In-Flight Test 1. Power CCTV System. 2. Select a monitor via the PHS panel, as destinat source. 3. Send "Camera Power On" command from PHS panel. 4. Select "External Sync" on monitor. 5. Observe video displayed on munitor. If video of stable raster), then this indicates that the cafrom the RCU and that the camera is producing so send Pan, Tilt, Focus, Zoom, ALC, and Gamma communitor or direct observation) verify proper op 7. Select Downlink as destination and camera under 8. Observe video routed to downlink. 9. Send "Camera Power Off" command via PHS panel. 10. Repeat Steps 3 through 9 except Issue commands proves that the CCTV equipment is operational in the command of the CCTV equipment is operational in the command of the commands proves that the CCTV equipment is operational in the commands of the command of the commands of the	eck to assure that each wire ded on data sheets. Operable and that the commands from high the sync lines to the Camera/PTU, ests also verify the camera's video and the monitor's ability to and path. ion and the camera under test as in monitor is synchronized (i.e., mera is receiving composite sync ynchronized video. ands and visually (either via the eration, test as source.	

REVISEO 5-7-87

FAILURE PROE AND CASE OR PRO 1EM RATIONALE FOR ACCEPTANCE .oss of *289 power RET .pem Norst Case: Loss of mission Critical video. Procurement Control	FMEA NO. W 5.12 CRITICALITY 2/2		SHUTTLE CCTV CRITICAL ITEMS LIST	UNIT CABVE DWG NO. 2293288-502, 503 I SSUED TO-14-86 SHEET 3 UF 5
Procurement Control - Wire, connectors, solder, etc. are procured from approvad vendors and suppliers which meet the requirements set forth in the CCTV contract and Quality Plan Mork Statement (MS-2593176). Incoming Inspection & Storage - Incoming Quality inspections are made on all received materials and parts. Results are recorded by lot and retained in file by drawing and control numbers for future reference and traceability. Accepted items are delivered to Material Controlled Stores and retained under specified conditions until cable fabrication is required. Mon-conforming materials are held for Naterial Review Board (NHB) disposition. (PAI-3U7, PAI IQC-53). Assembly & Test - Prior to the start of assembly, all items are verified upon by stock room personnel as the items are accumulated to form a kit. The Items are verified again by the operator who assembles the kit by checking against the as-built-startions are given in assembly drawing notes and applicable documents called out in the Fabrication Procedure and Record (FPR-2293288). These are 2280800 - Process Standard criming flight connector contacts, 2280801 - Process Standard in-line splicing of standard interconnecting wire using Raychem solder sleeves, 2280875 - Process Standard marking of parts or assembles with epoxy colors, 2280876. Potting material and test procedure (TP-AI-2293288). Quality and DCAS Inspections are performed at the completion of key operations. Preparation for Shipment - Nhen fabrication and test is complete, the cable assembly is packaged according to 2200746, Process Standard for Packaging and Handling Buidelines. All related documentation including assembly drawings, Parts List, ABPI, Test Bata, etc. Sealing and an advanced procedure stelly to each cable.		FAILURE EFFECT ON END ITEM	RATIONALE FOR AC	CCEPTANCE
		2) No video <u>Horst Case</u> : Loss of mission	Procurement Control - Wire, connectors, solder, and suppliers which meet the requirements set a Plan Work Statement (MS-2593176). Incoming Inspection & Storage - Incoming Quality materials and parts. Hesults are recorded by control numbers for future reference and traces Material Controlled Stores and retained under a fabrication is required. Non-conforming materi (MIA) disposition. (PAI-3U7, PAI IQC-53). Assembly & Test - Prior to the start of assembly by stock room personnel as the items are accumal verified again by the operator who assembles the as-built-parts-list (ABPL). Specific instructions are given in assembly dracelled out in the Fabrication Procedure and Rec Process Standard crimping flight connector contaplicing of standard interconnecting wire using Process Standard marking of parts or assemblies material and test procedure (TP-AT-2293288). (at the completion of key operations. Preparation for Shipment - When fabrication and packaged according to 2200746, Process Standard All related documentation including assembly dis gathered and held in a documentation folder	ty inspections are made on all received lot and retained in file by drawing and shility. Accepted items are delivered to specified conditions until cable lais are held for Naterial Review Board ly, all items are verified to be correct liated to form a kit. The items are ne tit by checking against the awing notes and applicable documents cord (FPR-2293288). These are 2280800 - tacts, 2280801 - Process Standard in-line g Raychem solder sleeves, 2280878 - s with epoxy colors, 2280876. Potting wality and DCAS Inspections are performed it test is complete, the cable assembly is if for Packaging and Handling Guidelines, rawings, Parts List, ABPL, Test Bata, etc. assigned specifically to each cable

FMEA RO. R 5.12 CRIFICALITY 2/2		SHUTTLE CCTV CRITICAL FTENS LIST	ONG NO. 2293288-502, 503 1\$SUED TO-T4-85 SHEET 4 OF 5
FAILURE MODE AND CAUSE	FAILURE EFFECT ON END LIEN	RAYIONALE FOR ACCEPTA	NCE
oss of +28V power RET	1) No PTU control 2) No video Worst Case: Loss of mission critical video.	FAILURE HISTORY There have been no reported failures during RCA test	ing, pre-flight or flight.
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REVISED 5-7-87

FMEA NO. W 5.12 ORITICALITY 2/2 FAILURE MODE AND CAUSE	FATCURE EFFECT	SHUFFLE CCTV CRITICAL ITEMS LIST RATIONALE FOR ACCEPTANCE	UNIT Cable UNG MO. 2293288-502, 503 USSUED TO-14-86 SHEET 5 DF 5
Loss of +28V power RET Open	1) No PTU control 2) No video Norst Case: Loss of mission critical video.	OPERATIONAL EFFECTS Inss of video. Possible loss of major mission objective other required cameras. CREW ACTIONS If possible, continue RMS operations using alternate videous training CREW TRAINING Crew should be trained to use possible alternates to COMISSION CONSTRAINT Where possible procedures should be designed so they can	șual cues. TV.